The Position of United States Shipping

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THE provision of necessary shipping facilities proved one of the most critical problems faced during the World War by both belligerent and neutral countries. In the later stages of the war its acuteness arose primarily from the scarcity of ships resulting from the unrestricted submarine warfare. From the beginning, however, there were serious dislocations owing to the disruption of ordinary trading operations and routes, the paralysis of port facilities, the diversion of ships and ports to military uses, and the near-stagnation of shipbuilding and repair activity in the belligerent nations. Government action to relieve these difficulties was slow in getting under way.

As a result of this 1914–18 experience attention was naturally directed promptly toward the probable effect

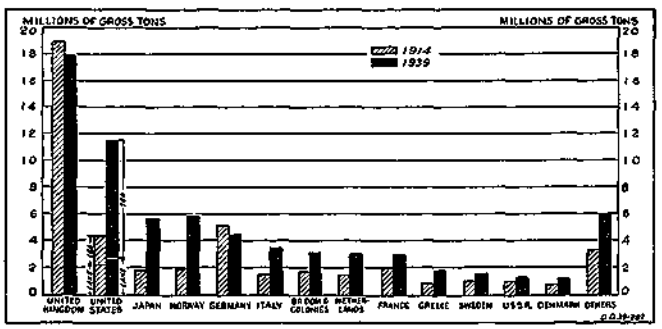

Figure 4.—World Steam and Motor Tonnage of Ships Over 100 Gross Tons, June 30, 1914 and 1939 (Lloyd's Register).

of the present European war on the shipping situation. Would the movement of our foreign trade be hampered or restricted by a shortage of ships, either in general or on specific trade routes? How would our own ships and shipbuilding activities be affected, particularly in view of neutrality legislation? Some tentative observations are possible at this time on the basis of the situation before the outbreak of war, the experience during the last war, and certain trends in the first 3 months of the present war. Most of the possible developments which are discussed in this article depend, of course, on the continuance of the war. Should the war be terminated in the near future, the world shipping situation will be entirely altered.

Tonnage Distribution.

In June 1939 the aggregate gross steam and motor tonnage of the world, according to *Lloyd's Register*, was 68,509,000 tons. Figure 4 gives the tonnage of the principal countries in 1939, and a comparison with their 1914 tonnage. There was an increase of 23,105,000 tons, 51 percent, from 1914 to 1939. Notable has been the eightfold increase in tankers to 11,437,000 tons. These vessels are owned chiefly by Great Britain, the United States, and Norway.

Throughout most of the post-war years there has been an excess of shipping facilities, arising in large part from State subsidization of national merchant fleets. The World War focused attention upon the defensive importance of carrying power, and total tonnage continued to increase after the war, although there was little economic need, except in the case of tankers, for it to do so. The trend was partly due to new construction, but it was also a result of the general reluctance to scrap old tonnage which had been built or bought at greatly inflated prices. More than off-setting this obsolescence, however, is the greater speed and general efficiency of carriers, as compared with 1914, plus improvements in port facilities and loading equipment. The world's merchant fleet in 1939 is not only 50 percent larger, but it is also more efficient per ton than in 1914.

The aggregate tonnage figures exaggerate the relative position of the United States as a maritime power. The merchant fleet of the United States is comprised of ships which would ordinarily be considered obsolete, and one-fifth was laid-up as of last June. The most modern part of the fleet is the tankers, with an average age of 16 to 17 years; the passenger ships average 21 to 22 years; and the freighters around 24 years. As can be seen in table 1, the United States fleet is much older than that of other leading maritime powers.

Table 1.—Age Distribution of Tonnage as of June 1939

Country	Percent in age group—					
	5 years or less	6–10 years	11–15 years	16–20 years	21–25 years	Over 25 years
United States (sea)	6	6	4	35	38	11
United Kingdom	21	11	24	21	12	11
Japan	27	11	7	16	23	16
Norway	24	21	18	16	10	11
Germany	20	5	23	33	5	14
Total, world	16	10	16	23	16	19

Source: *Lloyd's Register of Shipping, 1939–40.*

The United States merchant fleet is also considerably slower than that of other maritime powers. Approximately 70 percent of United States vessels are under 12 knots in speed, compared with less than 45 percent in the case of British ships. Ships having a speed of 15 knots and over comprise 13 percent of the United States fleet and 24 percent of the British.

World Shipbuilding Capacity.

The net increase in world tonnage in the year ended June 1939 was 1,654,000 tons, the largest net increase since 1921, except for 1928. Launchings in the calendar year 1938 approximated 3,000,000 tons, more than in any year since 1921. Despite this high level of activity, rough estimates indicate that in June 1939 world shipyards were working at about 75 percent of

normal capacity, with 2,859,000 tons of merchant vessels and over a million tons of naval vessels under construction. The bulk of the unused capacity was in Great Britain, where activity had dropped off rather sharply in early 1939. As a result of aggressive government programs, however, operations in both Great Britain and the United States have been stepped up considerably during the last 6 months.

The capacity for construction at any one time gives little indication of the capacity over a period of time. The size of a ship actually being built on a way may be considerably less than the maximum size which the way is equipped to handle. More important is the fact that the speed with which a ship is launched can be varied substantially, and this is a determining factor in estimating output capacity. An ordinary merchant vessel of, say, 8,000 tons customarily may require 9 months or a year for launching from the time the keel is laid. Recently, a 10,000-ton British ship was launched in 3 months' time.

The elasticity of ship construction is therefore substantial, and figures on construction capacity at any one time only roughly indicate the output capacity during the course of the year. Assuming a similar relationship between output and ships under construction as existed in 1938, and using the estimate of total capacity presented above, the maximum possible world launchings would have been in the neighborhood of four million tons. How much of this could have been increased by speeding up launchings at earlier stages of completion or by the use of night shifts, or to what extent expansion would have been prevented by shortages of skilled labor or materials, it is impossible to estimate.

Relation of Tonnage to World Trade.

While no exact computation of the excess of shipping facilities is possible, evidence of its existence is provided by several factors. First, in June 1939 there were 3,000,000 tons of laid-up vessels, and this total was substantially below that of previous years. Secondly, while total world tonnage had increased over 1913 by 52 percent in 1937 and by 55 percent in 1938, aggregate entrances and clearances in world ports, as shown by the League of Nations figures, had risen only 46 percent and 41 percent in the same years; and the extensive subsidization of shipping makes it likely that loads per ship in 1937 and 1938 represented smaller proportions of capacity than in 1913.

Recent movements in freight rates, furthermore, may give some indication of the extent of this excess capacity. In July 1937 entrances and clearances rose to 56 percent over the 1913 level, and that year also represented the post-depression peak of the League of Nations index of world trade volume. The movement of freight rates in 1937 seems to indicate that the sharp rise in world trade led to a mild squeeze in the provision of shipping facilities. An average of the indexes of rates on trade to and from four countries (Britain, Germany, Sweden, and Denmark) was 117 for 1937, compared with 84 for 1936, 93 for 1938, and 89 for the first 5 months of 1939. Furthermore, the upward movement of freight rates was very sharp in the period May to September 1937, reaching a peak of 134 in the latter month.

Consequently, the level of shipping activity during the middle of 1937 can be considered, after adjustments for changes in total tonnage, as representing close to full utilization of shipping facilities for any short-run period. This level was about 15 percent in excess of the level during January–June 1939. Over a longer run there is some elasticity in the supply of shipping facilities, arising not only from new construction, but also from the reconditioning of laid-up tonnage, the more efficient rearrangement of existing routes and ships, and the extension of the life of ships which would ordinarily be broken up.

Immediate Effects of the War.

The above brief outline of the shipping situation at the outbreak of the present war indicates a substantially more favorable position than in 1914. The outbreak of war in September had several immediate repercussions. The bulk of the 4,483,000 tons of German vessels were swept off the seas and immobilized. While this reduces the supply of shipping facilities, the impediments to ocean trade with Germany, except in the Baltic, also curtail the need for facilities. Entrances and clearances in German ports (including Danzig and Gdynia) amounted to around 7 percent of the world total, whereas her tonnage constituted 6.5 percent of world tonnage.

Requisitions for military purposes by the belligerents are also important. During the 1914–18 war, over 20 percent of British merchant tonnage on the average was in military or naval employment, the range being from 4 million tons shortly after the outbreak of war to nearly 7½ million tons in May 1916. The extent and nature of war is important in determining the military requirements. If the present war is confined to the western front the needs will be substantially less than if fighting should spread to the Mediterranean and Asia Minor. If the productive facilities of France are maintained unimpaired, its dependence on supplies from Britain will be less than in the last war. Finally, troop ships are ordinarily passenger liners, for which there is substantially reduced demand for commercial purposes during a war. It is unlikely that requisitions are as yet or will be in the near future as large as in the early stages of the last war.

War conditions, also, immediately involve important delays and inefficiencies in shipping operations. Neutral ships carrying goods to belligerent zones suffer delays from contraband control. Roundabout routes must frequently be substituted for ordinary routes. The needs of the military for port facilities and delays owing to contraband control are certain to cause some port congestion. The convoy system ordinarily in-

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volves very substantial delays, as each vessel is forced to make intermediate voyages to the port of assembly and there must frequently wait some time for the convoy to be collected. On voyages, the speed of the convoy group is reduced to that of the slowest ship, and zig-zag tactics and round-about routes must frequently be used. In addition, port congestion is increased by the arrival of ships in large groups rather than a daily stream. The British convoy system in 1917–18 increased the average length of a round-trip voyage in the North Atlantic by 25 percent.

Offsetting these factors, however, is the tendency for ships to carry substantially larger loads per trip. During the last war the quantity of imports per ton of shipping entering British ports increased 44 percent between 1913 and 1917—each ship carried on the average almost half again as much cargo.

Long-Run Determinants.

The influences just discussed are important in the period following the outbreak of war. They would not, however, determine the adequacy or inadequacy of shipping facilities in an extended war. This would be determined primarily by three factors: the extent of losses, the level of shipbuilding, and the trends in the tonnage of sea-borne trade.

During the 1914–18 war the Allied and neutral countries lost 12.8 million tons through enemy action and 2.2 million tons through marine risk or capture—an aggregate of 15 million tons—40 percent of their total fleets in 1914. The Central Powers lost 0.2 million tons through enemy action, 2.4 millions through capture, and 0.4 million by marine risk, making a total of 3 million tons—nearly 60 percent of their pre-war tonnage. The monthly average for the war period of Allied and neutral losses due to enemy action was 251,000 tons; including losses from marine risk, the average was 295,000. Losses were 100,000 tons a month in 1914 and reached a peak in the second quarter of 1917, when they averaged 746,000 tons monthly. Thereafter they declined steadily to 178,000 in October 1918.

It would be logical to expect the present war to start out at a stage considerably in advance of the operations in 1914, insofar as shipping operations are concerned. According to official reports, in the period September 3 to November 23, a total of 331,000 tons of Allied merchant shipping and 142,000 tons of neutral shipping were sunk—a monthly average of 173,000 tons. In addition, 52,000 tons of German ships were sunk. The bulk of the Allied losses came in the period immediately following the outbreak of war, when ships were scattered and without convoy protection. Of total British losses to date, 46 percent or 131,000 tons occurred in the first 2 weeks of the war. Up to the present, therefore, the Allied and neutral losses of merchant ships have not been of a serious nature. They could probably increase to double the rate so far without seriously impairing shipping facilities, if shipbuilding operations are maintained. On the other hand, losses during the week beginning November 18 rose abruptly to a level nearly equal to that of the first 2 weeks of the war, as a result of the destructiveness of German mines. The progress of the war so far, therefore, does not provide conclusive indications as to how Allied and neutral ships will fare in the future.

The convoy system was not started by the British until February 1917, and by the latter part of 1917 only half of the British over-sea traffic was running either in ocean or short-sea convoys; by the end of the war, the proportion was 90 percent. The system proved successful; of 16,693 vessels escorted on ocean convoys, 99 percent arrived safely at port. This time the convoy system was inaugurated shortly after the outbreak of war and was undoubtedly responsible in large part for the sharp decline in Allied losses from the level of the first 2 weeks.

With respect to world shipbuilding output, British policy is of primary importance. It is already apparent that the British Government is not making the mistake of the last war, when it permitted the output of mercantile tonnage to dwindle to less than 100,000 tons in the last quarter of 1915. An aggressive program of construction was inaugurated in Britain last spring and has been stepped up further since the outbreak of war. In neutral countries shipbuilding operations are at or near post-war peaks. The outlook, therefore, is for expanded world ship production; British launchings alone may reach two or three times the 1938 level of 1 million tons, if shipbuilding operations are not impeded by aircraft destruction.

Ship output can be speeded up in an emergency by the adoption of standardized ship construction. Such programs were adopted by Britain at the end of 1916, and by the United States under the Shipping Board. At the Hog Island plant standard ships were assembled from 20,000 pieces made from blueprints of a model ship and manufactured at plants all over the country. If it is felt undesirable to undertake a standard ship construction program, substantial economies of money and time can be achieved through "repeat ships," that is, additional production of an ordinary commercial ship of a widely used type.

Decline in Tonnage of Sea-Borne Trade.

It seems almost certain that the tonnage of belligerent trade will decline as it did in the last war. First, the British blockade prevents in large part the carrying-on of ocean trade with Germany, and German blockade of the Baltic cuts off that area to Allied and probably to neutral shipping. Secondly, the British have already indicated their intention to restrict imports to essentials from the outset and to conserve their exchange resources by consumer rationing, import prohibitions and restrictions, and exchange control. In the last war no important steps were taken to restrict imports until the end of March 1917, when the importation of a long list of commodities was prohibited except

under license. As a result, the quantity of total imports fell from 81 percent of the 1913 figure in 1916 to 64 percent in 1918.

A further tendency affecting unfavorably the quantity of trade is the shift toward the movement of finished goods requiring less cargo space than crude materials. Belligerent imports of machinery, airplanes, explosives, and similar manufactures tend to increase, whereas imports of such bulky commodities as lumber, cotton, and paper materials tend to decrease.

The tonnage of nonbelligerent trade may also be unfavorably affected. The trade of neutral countries in and around the war zone declined sharply in the last war. A comparison of entrances and clearances in 1915–18 with 1913 shows an 81-percent decline in the case of the Netherlands, a 35-percent decline for Norway, and a 49-percent decline for Spain. While these declines do not represent necessarily a comparable drop in the quantity of trade, since ships tend to carry fuller loads, nevertheless they indicate the decrease in the demand for shipping facilities. In the course of this war the trade of the western European neutrals is likely to suffer again, to a degree depending upon war losses and the effectiveness of the blockades..

Two factors tend to increase the quantity of non-European neutral trade, namely, the shifting of former trade with Europe, notably Germany, to non-European routes and the stimulus to incomes in neutral countries as a result of the war. However, although the value of non-European trade rose sharply in the last war, the requirements for shipping facilities actually declined. Japanese entrances and clearances declined 22 percent in 1915–18 under 1913; those of the United States, 9 percent. United States entrances from and clearances to Latin American and West Indian ports declined 10 percent, despite a value increase of 72 percent.

Combining the expected sharp decline in the tonnnage of belligerent trade with the prospects of neutrals around the war zone and elsewhere, the result indicates not only no likely increase in the aggregate tonnage of world trade, but a possible decrease of substantial proportions.

Possible Shifts in Trade Routes.

In addition to the effects just discussed on the total supply of and demand for shipping facilities, war conditions also tend to induce shifts of tonnage among the various trade routes by both belligerents and neutrals. A dominant factor in the shipping situation, not only in belligerent trade but in trade throughout the world, is the policy which the British adopt with respect to their ships operating on non-British routes. Only slightly less important are the policies of neutral countries, such as Norway and the Netherlands, with respect to the withdrawal of their tonnage from danger zones and its reallocation to other routes.

Both of these factors depend in large part on the effectiveness of German ocean warfare. In the last war when the tonnage situation became acute as a result of the losses and the withdrawal of neutral tonnage, the British adopted the policy of Atlantic concentration. Cross services or direct services to distant countries were stopped or drastically reduced in order that every available ship might be employed in bringing cargoes from the nearest available sources. As a result of this policy, British tonnage engaged in non-British trade declined from an estimated 7,675,000 tons in 1913 to 3,703,000 tons in 1918, despite the fact that the amount of British tonnage engaged in French and Italian ocean trade rose sharply.

To the degree that German ocean warfare proves effective, the neutral countries will tend to withdraw their ships from belligerent trade routes and to attempt to place them on other trade routes. This in turn will force some diversion of belligerent tonnage from nonbelligerent trade and the concentration of that tonnage on the most essential routes. During the World War there occurred a sharp decline in the tonnage of foreign ships in the trade of the United Kingdom, especially in 1917 and 1918 when submarines were active. The following table shows an index of the tonnage entered with cargoes in British trade: [2]

Year	*British*	*Foreign*	*Total*
1913	68	32	100
1915	56	25	81
1916	50	24	74
1917	46	10	56
1918	49	8	57

The sharp drop in foreign ships operating on British routes was primarily a result of the unwillingness to risk ships in combat areas. In view of the Norwegian experience during the last war, when nearly half its merchant fleet was lost, the neutral countries in this war may be expected to take measures to prevent any large-scale destruction of their fleets. To some extent these tendencies have already appeared in the present war. Large amounts of tonnage have been withdrawn from United States trade routes, primarily routes to Europe. At the end of the first week of October, nearly 200,000 tons of foreign ships had been withdrawn in ports outside New York. Of these, around 75,000 tons were Norwegian ships taken from United States-British routes, and much of this was reallocated to United States-Latin American routes. Finally, the action of the United States in withdrawing its ships from north European routes is an extreme example of a shift in neutral tonnage, which in turn will induce some shifting on the part of other tonnage.

Summarizing the position of shipping, it appears that, unless war losses are unexpectedly large, facilities will be more than ample, at least for nonbelligerent trade. The rising level of shipbuilding and the probable decline in the total tonnage of sea-borne trade in an extended war makes it possible that the next few years will produce an even larger excess capacity than

[2] Source: C. E. Fayle, *The War and the Shipping Industry* (London, 1920), p. 276.

that existing in the first half of 1939. If, on the other hand, war losses should prove to be severe, shortages will appear on belligerent trade routes (as a result not only of the losses but also of the probable withdrawal of neutral tonnage), and attempts by belligerents to purchase old and new ships abroad can be anticipated.

Restrictions of Neutrality Legislation.

In the case of the United States fleet, the chief direct effect of the war arises from the neutrality legislation recently passed by Congress. Figure 5 shows the areas forbidden to American ships as a result of the Presidential proclamation under the law: Zone 1 constitutes the combat area, into which ships are forbidden to enter; Zone 2 is the area in which ships are forbidden to visit belligerent ports unless not carrying cargo or passengers; and Zone 3 is the generally unrestricted area. The merchant fleet was employed on trade routes as shown in table 2. Only 19 percent was engaged in overseas trade, of which 9 percent was on European and Mediterranean routes.

As the combat area is now defined, approximately 600,000 tons of United States shipping will be affected. This amounts to about 38 percent of the tonnage engaged in overseas trade. Mediterranean, Black Sea, and Arctic routes remain open, and the possibility exists, of course, that United States vessels can carry cargoes to open ports from which they can be transshipped to final destinations. As long as ample shipping facilities are available on the forbidden routes, however, the extensive use of United States ships in this manner is not likely.

What are the possibilities of shifting the withdrawn American tonnage to other routes? At the present time the total tonnage operating on United States trade routes is probably more than adequate to service the demand for shipping facilities. The possibility of placing American tonnage onto other routes depends, therefore, on the withdrawal of foreign tonnage from such routes, on the favorable competitive position of United States lines which is presumably possible only through subsidies, or on an increase in the quantity of trade.

It is not unlikely, as already mentioned, that some belligerent tonnage will be transferred from nonbelligerent to belligerent routes, the extent depending largely on such factors as war losses and the spread of war zones with the consequent need of tonnage for military purposes. Furthermore, it may be expected—providing the volume of trade is maintained—that some belligerent or neutral ships will be transferred to Atlantic routes to replace the United States ships withdrawn. That these transfers will equal the United States withdrawal in the near future is unlikely, since there have been excess facilities on Atlantic routes up to the war period and the decline of passenger traffic will make available additional space for cargo purposes. In addition, the tonnage of belligerent trade is likely to decline.

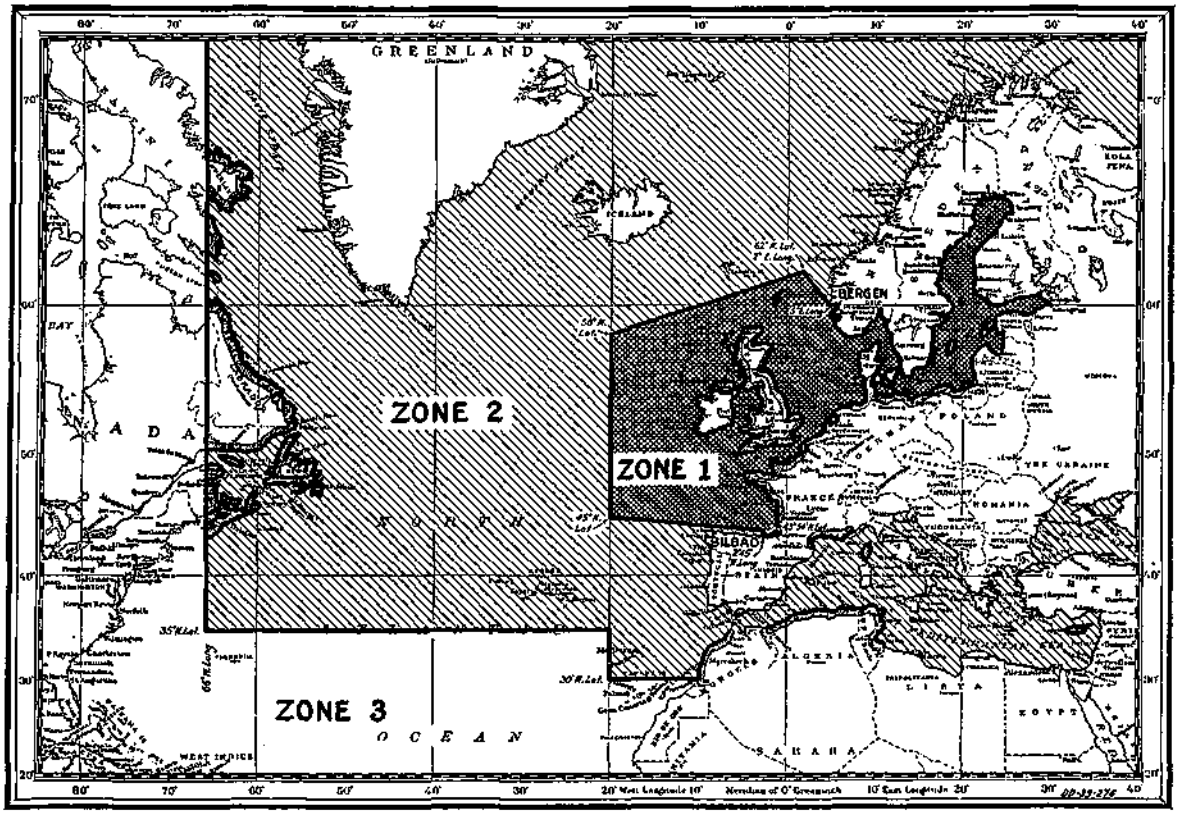

Figure 5.—Zones Established Under the Neutrality Act, 1939 (Prepared by the Division of Commercial Laws, U. S. Bureau of Foreign and Domestic Commerce).

Table 2.—Employment of United States Steam and Motor Vessels, over 1,600 Gross Tons, as of June 30, 1939 (Excluding Lake and River Tonnage)

[In thousands of gross tons]

Item	Passenger and freight	Freight	Tanker	Total	Percent of total
Laid-up	306	1,206	224	1,736	21.3
Coastwise trade	300	1,871	2,127	4,298	52.9
Nearby foreign [1]	209	142	182	533	6.6
Overseas foreign:					
Europe and Mediterranean	190	452	62	704	8.7
Africa	3	74		82	1.0
Orient and Far East	60	75	19	154	1.9
Australasia and India	36	88		124	1.5
South America	124	179	17	320	3.9
Around the world, etc	76	28	74	178	2.2
Total overseas	494	896	172	1,561	19.2
Grand total	1,309	4,115	2,705	8,129	100.0

[1] Includes Canada, Mexico, Central America, West Indies, and north coast of South America.

Source: United States Maritime Commission.

On the other hand, it has also been noted that neutral countries are likely to be hesitant to continue large-scale operations between the United States and belligerent countries, particularly if war losses run high. While this may involve further shifts of Allied ships to Allied routes, it will also increase the competition of neutral shippers on nonbelligerent trade routes. It can be anticipated that this neutral competition will prevent American ships from capitalizing to the full on the diversion of belligerent shipping from United States trade routes outside the war zone.

Approximately 28 percent of United States entrances and clearances in 1938 were United States ships, 34 percent were ships of belligerents in the European war, and 38 percent neutral ships. Figure 6 shows the tonnage entered and cleared at United States ports in 1938 by geographic regions and the nationality of the carrying ships. On the basis of a rough estimate, approximately 155,000 tons of belligerent shipping were engaged in carrying trade between the United States and Latin America. An additional 575,000 tons was engaged in United States trade with Australasia, the Orient, and the Far East. An outside total of the expansion possible for United States shipping under the neutrality legislation—assuming 1938 trade activity—is 730,000 tons. That assumes complete withdrawal of belligerent ships from United States trade, other than with Europe and Africa, and no replacement by neutral shipping. This compares with 600,000 tons which have to be withdrawn from European routes. Since it is unlikely that all belligerent shipping will be withdrawn—at least immediately—from United States trade routes with countries outside the war zone, and furthermore, since it is certain that United States shipping will have to share such diversion as does occur with neutral tonnage, it seems probable that the neutrality legislation will cause the laying-up of some United States tonnage, for a time at any rate.

A further possibility is the sale of United States ships to foreign countries. During the World War 263,000 tons of shipping were sold to aliens. The prices of ships soared along with freight rates. If shipping facilities again become scarce on belligerent routes as a result of extreme war losses, the Allies might attempt

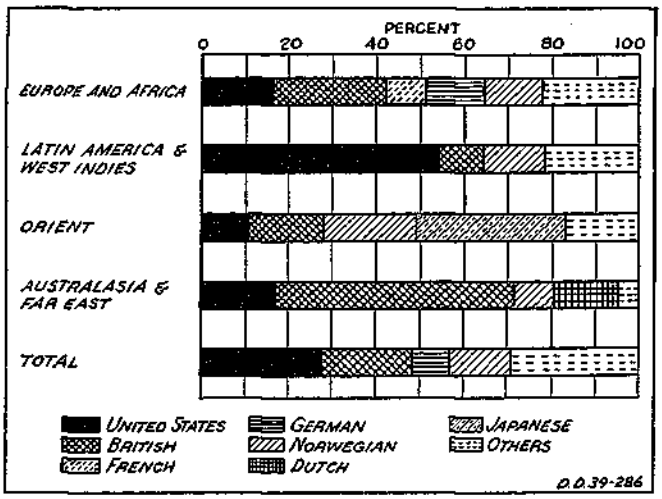

Figure 6.—Percent of Entrances and Clearances in United States Foreign Trade, by Trade Routes and Nationality of Vessels for the Year 1938 (U. S. Bureau of Foreign and Domestic Commerce).

to purchase tonnage from United States owners, even though the tonnage available for sale would largely be obsolete and inefficient. The possibility also exists for the transfer of United States vessels to foreign registry, subject (as in the case of sales) to the approval of the Maritime Commission. Between October 1937 and August 1939 vessels totaling around 300,000 tons were sold or transferred; and in September and October 1939, 215,000 tons were sold or transferred. However, in November permission was refused the United States Lines to transfer eight of its vessels to Panamanian registry.

Should it become necessary to extend the combat area to include Mediterranean and all British Dominion waters, an additional 500,000 tons of American ships would be affected or 1,100,000 tons in all, and the maximum possibility of replacement owing to the withdrawal of belligerent ships would be reduced to less than 500,000 tons. Furthermore, to include Australasia and Far Eastern waters in the war zone would be to put our essential import trade with that region in an extremely vulnerable position, as a result of its present dependence upon British and neutral shipping. In 1938, British ships provided 56 percent of entrances and clearances in our trade with that region, and neutral ships 25 percent.

The Maritime Commission Program.

In view of the unfavorable prospects for full utilization of the existing United States merchant fleet the question naturally arises as to the need for new construction under the program of the Maritime Commission. The answer to this question lies in the fact that the merchant marine is vitally important, not only as some insurance of services for essential foreign trade,

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month end to the highest total for that month since 1929. While a favorable showing was made in September, due principally to the unseasonal placement of the new orders, the absolute volume of car orders on hand was still only about half the number on hand at the high point of 1937. The comparative position of orders for locomotives was not so favorable as that for freight cars.

Reports for October reveal further increases in the quantity of unfilled orders on hand, though the wave of buying has receded with November placements much reduced. Unfilled freight-car orders at the end of October were about equal to those held in August 1937, and locomotive orders to those held in December 1937. Some gains in employment above that shown in table 3 are, therefore, to be expected. However, these gains may not be great unless further orders are placed in substantial amounts.

Because of the long period of production for the major products and because of shifts in type of output, neither new orders, unfilled orders on hand, nor shipment data for railway equipment afford complete measures of activity in this industry. The employment and payroll data compiled by the Bureau of Labor Statistics of the United States Department of Labor, corrected to the various Census reports, afford perhaps the best indication of the actual trend of operations, including those forms of activity which are related neither to the manufacture of new cars nor to the building of new locomotives. Repair work done by the car industry, as reported by the Bureau of the Census of the United States Department of Commerce, adds some stability to an otherwise widely fluctuating total value product. While the total value of cars and parts produced fell from 225 million dollars in 1929 to almost 10 million dollars in 1933, the decline in receipts for repair work was from 97 million to 33 million dollars. During this period, employment fell about two-thirds and pay rolls three-fourths. In 1935, receipts for repair work of almost 48 million dollars again exceeded the value of cars and parts produced, and in 1937 a further increase was reported in repairs although the much greater increase in building operations reduced the relative position of this item in the total. Another source of activity which has become of considerable importance to the car industry is the production of other metal products not normally classified in this industry. While this type of production represented less than 6 million dollars of a total of 328 million dollars in 1929, its importance had increased by 1937 to the point that out of a total of 335 million dollars almost 35 million dollars worth of products not normally classified in this industry were reported.

Repair work has not been so substantial a buffer for the locomotive industry as for the car industry, but the manufacture of products not normally belonging to the industry represented more than half of the total product in 1933 and one-fourth in 1935. The percentage-to-total decreased considerably in 1937 as a result of the relatively large orders for new locomotives, but a sizable increase in the "other products" item was nevertheless reported. Both the car and locomotive building industries have developed along lines which offer them limited basic stability even though their main source of operations fluctuates very widely.

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but also for purposes of national defense. It has been estimated that, in the event of war with a major power, the military forces alone would require at least 1,000 ships, aggregating 6,000,000 gross tons. In terms of tonnage the present merchant fleet could meet these requirements, but in terms of speed and efficiency it could not.

Most of the present tonnage of this country comprises ships hastily built under the Shipping Board program. In 1914, United States sea tonnage amounted to 2 million tons; in 1921 the total was 13.5 millions, with the bulk of the increase appearing in 1919–21. From 1922 until the present Maritime Commission program got under way, however, American shipbuilding was almost stagnant. Total sea-going tonnage declined steadily from 13.6 million tons in 1922 to 8.9 million tons in 1939. Not one ocean-going ship was launched between 1922 and 1928. The present program of the Maritime Commission calls for 500 ships to be built during the 10 years ending 1948, roughly a goal of 4,000,000 gross tons.

Within the next 3 years over 3 million tons of United States ocean-going vessels will pass the 20-year mark, in addition to the 4½ million tons now over 20 years old. This total of 7½ million tons represents nearly 90 percent of our present merchant fleet. The Maritime Commission program, therefore, is consistent with replacement needs for national defense alone, regardless of the wartime effects on the shipping industry.

American shipyards are currently operating at a higher level than at any time since 1921, chiefly owing to the Maritime Commission and naval construction programs. In October 1939 over 1,000,000 gross tons of sea-going vessels were under construction or on order, more than double the figure of a year previous. In addition, on October 1 naval vessels of 510,000 tons displacement were under construction, of which around 240,000 tons were in private yards.